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# The Broad Challenge of Public Engagement in Science

## Commentary on: “Constitutional Moments in Governing Science and Technology”

Rinie van Est

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**Abstract** Timely public engagement in science presents a broad challenge. It includes more than research into the ethical, legal and social dimensions of science and state-initiated citizen’s participation. Introducing a public perspective on science while safeguarding its public value involves a diverse set of actors: natural scientists and engineers, technology assessment institutes, policy makers, social scientists, citizens, interest organisations, artists, and last, but not least, politicians.

**Keywords** Participation · Public understanding of science · Technology assessment · Upstream public engagement

## Introduction

Sheila Jasanoff observes the Western world is witnessing a “constitutional moment” in which the rules of governing science and technology are being fundamentally rewritten, altering the relations between citizens, experts and the state (Jasanoff 2011). The discourse that drives this reform centers around the notion of “upstream public engagement,” which is a plea to involve publics earlier on in the research and development (R&D) process. Jasanoff situates the current US interest in public engagement in the context of two long, generational cycles of attempts to reform citizen participation in decisions related to science and technology. While she deplores the current lack of genuine contestation among

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R. van Est (✉)  
Technology Assessment Department, Rathenau Institute, P.O. Box 95366,  
2509 CJ The Hague, The Netherlands  
e-mail: q.vanest@rathenau.nl

R. van Est  
School of Innovation Sciences, Eindhoven University of Technology, P.O. Box 513,  
5600 MB Eindhoven, The Netherlands

science, state and society concerning science and technology in the United States, Jasanoff appears to be hopeful about the future, noting that “public engagement may prove to be the right participatory formula for this historical moment, at least in the context of democracy in America” (Jasanoff 2011).

A similar “constitutional moment” in governing science and technology may be emerging in Europe. At the same time it would be problematic to speak of a “European” model of public participation in decisions related to science and technology, since various European countries handle the science-state-society relations very differently. In fact, in many European countries, there is still little call for upstream engagement (Nature 2004). Nevertheless, one can focus on two trendsetting European states: the United Kingdom and the Netherlands.

### United Kingdom: Public Engagement’s Late Arrival and Reinvention

Jasanoff’s insightful historic account about the American situation (Jasanoff 2011) provides a number of interesting themes for reflecting on the European scene. How did the notion of public engagement develop in Europe with respect to technology and science? What is the role of ethics in the European debate on science and technology, and is it primarily seen as an expert-based activity? Do courts in Europe play a similar role in enabling public participation as in the United States?

In the United Kingdom (UK) the notion of upstream public engagement has been developed and popularized. As in the United States, the educational or enlightenment model of public understanding of science (PUS) has shaped the thinking in the UK about the relationship between science and society since the early 1970s (Durant et al. 1989). According to this so-called *information deficit model*, scientists are knowledgeable experts, and the public is characterized as having inadequate knowledge (Wynne 1995). This PUS model adopted a one-way, top-down communication process in which the scientific community tried to inform and educate the general public about science (Durant 1999). Only at the beginning of the twenty-first century did the public engagement in science (PES) model (Miller 2001; European Commission 2007) enter the stage and become the dominant policy discourse. In this debate the notion of upstream public engagement has come to play a central role.

#### Public Understanding of Science

Public understanding of science (PUS) has been around since the early 1970s. It was, however, put firmly on the agenda in the mid-1980s, when the Royal Society (1985) called for the improvement of public knowledge and appreciation of science and technology. In 1993, the government made PUS the official policy when it published *Realizing our potential* (HMSO 1993). Interestingly, in the same year the first Danish-style consensus conference was also held. The UK national consensus conference on Plant Biotechnology was organized by the Science Museum in London and funded by the Biotechnology and Biological Science Research Council (BBSRC). The organizers saw this public participatory event as a way of trying to overcome the then dominant deficit model (Durant 1995).

Despite this ‘public understanding of science’ context, and notably in contrast to the United States, the United Kingdom excelled in public debate and regulation around human embryology and genetics (Franklin 2006). In the UK, the birth of the first child conceived using in vitro fertilization (IVF) in 1978 encouraged a long-term deliberation on regulation. Twelve years later, this resulted in the Human Fertilization and Embryology Act and the establishment of the Human Fertilization and Embryology Authority (HFEA). According to Sarah Franklin: “The Act remains the most extensive, substantial and detailed legal framework ever created to regulate and govern what had previously been the legally uncharted territory of ‘human fertilization and embryology’” (Franklin 2006, p. 92).

### Public Engagement in Technology

Since the mid-1990s, the interest in public participation and consultation in science and technology grew (Joss 2002). Pressurized by the bovine spongiform encephalitis (BSE) crisis and the intensive public controversy on genetically modified (GM) crops in the late 1990s, PUS was dismissed as ‘a rather backward-looking vision’ in the year 2000 by an influential House of Lords report, with the revealing title *Science and Society* (House of Lords 2000). The report detected “a new humility on the part of science in the face of public attitudes, and a new assertiveness on the part of the public” (House of Lords 2000—paragraph 5.1). It acknowledged that science had to involve itself in a dialogue with the public. This new paradigm could build further on some early experiments with participatory methods, and the positive experience with the public debate around human embryology and genetics.

A series of public debates on the future of genetically modified crops and food dubbed the *GM Nation?* debate, started in 2003 and was the first government initiated attempt at public engagement in the UK. It is widely believed, however, that the UK government has ignored the results (Nature 2004). Some even depicted it as a ‘fiasco’ (Taverne 2004). But the most revealing reflection on the *GM Nation?* debate, surely comes from the PAGANINI-project (2007 p. 50):

GM Nation ... was set up in response, and as an alternative, to informal participation at National Seed List Hearings. Formal, state-initiated participatory arrangements, as the case studies on GM plants and genetic testing show, are often swayed by the desire to achieve balanced representation among participants, to mirror the “general public.” They are composed of individual participants who take no particular interest in the respective issue or who are as yet “unspoiled” by partisan views and supposedly open to “rational” education.

This insightful remark shows the need to be reflexive about the meaning of the word “public” and “publics”, and the political use of these concepts. The Dutch case described below (see “[The Netherlands: Towards A Broad Conception of Public Engagement](#)”) further examines the social and political construction of the notion of “public engagement”.

## Upstream Public Engagement in Science

The UK was fairly late in adopting the public engagement model. Because of this it leapfrogged and modernized the existing European discourse on public participation, through bringing in the word “upstream.” It is important to notice that the adjective “upstream” entered the lexicon of public engagement in the aftermath of the genetech controversy and in the context of nanoscience. Policy makers and the business and science communities wanted to avoid nanotechnology becoming ‘the next GM’. Hereby, the focus of engagement shifted from technology towards science and decisions about the R&D agenda. As such, public engagement in science (PES) was seen as the new challenge. This was picked up rapidly by the science community and decision-makers. For example, the Royal Society’s report on nanoscience argues that public engagement should be organised “at a stage when it can inform key decisions about their development and before deeply entrenched or polarised positions appear” (Royal Society 2004, p. xi).

Upstream public engagement was clearly inspired by the American program which aimed at understanding the ethical, legal, and social issues (ELSI) surrounding the Human Genome Project (National Human Genome Research Institute 2008). The British, however, brought in a participatory approach. This was based on three points of critique towards the American ELSI approach (cf. Wilsdon and Willis 2004; Macnaghten et al. 2005). First, the ELSI program was thought to be too expert-oriented (as Jasanoff also observes), and thus more diverse and plural forms of public knowledge should enter the debate on science. Second, ELSI research was “framed as being able to scrutinize only the impacts or effects of the technology rather than deeper social and political considerations” (Macnaghten et al. 2005, p. 6). It was argued that, besides the risk issue, more fundamental social issues around ownership, control and social ends, should be part of the debate. Third, advocates of upstream engagement also pointed at the lack of impact of ELSI research, and stressed that upstream activities should be linked back to the decision-making of scientists, industry, and policy makers.

## The Netherlands: Towards A Broad Conception of Public Engagement

Contrary to the UK, the Netherlands has almost three decades of experience with state-initiated forms of public participatory arrangements (Van Est et al. 2002). During this period, the meaning of public participation has changed, constantly challenged by new types of scientific and technological developments. Public participation in the 1980s referred mainly to the involvement of organized civic society groups. At the beginning of the 1990s, and in response to the upcoming ethical debate around biotechnology, the meaning of public engagement was broadened towards individual citizens. Paradoxically, this led to a tendency within the government to equate public engagement with citizen participation. Over the last decade, in the context of big state-initiated research programs in the field of genomics and nanoscience, awareness has risen about the need to evaluate the social meaning of science in an early stage.

## From Informal to Formal Public Engagement: 1965–1990

At the beginning of the twentieth century, Dutch society became organized along four socio-cultural ‘pillars’: Protestants, Catholics, socialists and liberals (Lijphart 1968). Effectively, only the elites of these pillars were involved in decision-making. This changed after the mid-1960s, when a call for democratization and participation went hand-in-glove with a growing distrust of the establishment. In the field of technology, in particular the nuclear energy debate challenged existing relationship between science, technology and society (cf. Jamison et al. 1990). The governmental plan in 1973 to extend the use of nuclear power met with strong resistance within Dutch society. A number of massive anti-nuclear demonstrations were held between 1977 and 1979.

In response to this turmoil, the Dutch government decided to organize the Broad Societal Discussion around Energy Policy (BMD). This first government-initiated public debate began in 1981 and continued until 1984. During this period Dutch citizens could voice their opinion about the further development of nuclear energy. The BMD was a mixed success. On the one hand, it mitigated much of the direct confrontation between anti-nuclear activists and the establishment (Cramer 1990). On the other, the usefulness and credibility of a government-initiated public debate was severely challenged by the BMD. For although the public clearly rejected nuclear power, public policy did not change. Incidentally, 2 years later the nuclear reactor accident in Chernobyl did change it.

The grand public debate on energy, but also the small-scale, expert-oriented debates on genetic engineering and micro-electronics,<sup>1</sup> led the Dutch Ministry of Science and Education to reflect on how to involve a broader public in opinion-forming and decision-making on a more regular basis. In 1984 this led to a policy paper on the integration of science and technology in society (Ministry of Education and Science 1984). It proposed to set up an organization to disseminate information on science and technology and a national Technology Assessment (TA) organization. Both organizations were established in 1986. Interestingly, the Dutch policy makers saw the public understanding of science (PUS) model and the public engagement in technology (PET) model as complementary.

The TA organization, now called the Rathenau Institute,<sup>2</sup> was inspired by the U.S. Office of Technology Assessment (OTA), which had been created in 1972 by law to strengthen the position of the Congress in dealing with science and technology.<sup>3</sup> The establishment of the US. OTA led European governments to

<sup>1</sup> For both topics advisory committees had been set up. The Advisory Group on the Social Implications of Micro-electronics advised the government in 1979 to set up TA organisation (Rathenau Adviesgroep 1980). In 1981, the government had set up the so-called Broad DNA Committee to study the social and ethical aspects of genetic engineering (Brede DNA Commissie 1983).

<sup>2</sup> At that time the TA organisation was named NOTA, Netherlands Office of Technology Assessment. In 1993 an evaluation concluded that NOTA was too scientifically oriented and recommended the organisation strengthen its role in stimulating political and public debate. As the mission shifted, the name changed to the Rathenau Institute.

<sup>3</sup> The original act of 1972 had defined OTA’s functions loosely: “to provide early indications of the probable beneficial and adverse impacts of the applications of technology and to develop and coordinate information which may assist the Congress” (cf. Vig and Paschen 2000).

become interested in parliamentary TA in the 1970s. It was not until a decade later, however, that the first parliamentary TA office was established in France. Denmark and the Netherlands established agencies in 1986, Britain and Germany created similar agencies in 1989. This did not lead to a “European” model for parliamentary TA (Vig and Paschen 2000). Especially Britain and Germany saw parliamentary TA as a form of expert policy analysis. Denmark and the Netherlands, however, saw the practice of TA as a more general and “open” process for involving the public in policy dialogues and building societal consensus on issues of technological change (Van Eijndhoven 1997). In the 1980s, “public participation” for the Rathenau Institute basically referred to involving experts and stakeholders in order to identify key issues and clarify basic visions in an early stage of the political decision-making process. This was part of a wider development. During the 1980s, the new interest groups that had become established in the 1970s gained a permanent place at the negotiation table, and became integrated into the Dutch corporatist model.

### Broadening and Narrowing the Meaning of Public Participation: 1990s

In the late 1980s, an intense debate had started on the ethical issues associated with biotechnology and animals. This emerging biotechnology debate led the Minister of Science and Education to plead in 1991 for the organization of debates on ethical aspects of science and technology. The Rathenau Institute was asked to take up this task, and did so by co-operating with, for example, the Health Council. Under the banner of the Platform on Science and Ethics, the Rathenau Institute tried out several methods to stimulate public participation and debate on normative issues (cf. Van de Poll 1997). As Jasanoff describes, ethics in the United States was institutionalized as an expert activity. In contrast, in the Dutch context the notion of ethics led to a broadening of the concept of public engagement, which came to include the involvement of lay individuals. This new way of thinking was inspired by the debate in Denmark, and led in 1993 to the first Dutch consensus conference on genetic modification of animals. The immediate cause of this event was the birth the year before of the first transgenic bull Herman, which had been created by a Dutch biotech company. While the effort has been repeated a few times, the consensus conference format has not become a familiar phenomenon within the Dutch political system, as it did in Denmark. Nevertheless, political interest in public participation continued to grow during the 1990s, particularly in the field of biotechnology (Joss and Bellucci 2002). Recalling the BMD, the Dutch Parliament asked the government to organize ‘broad societal debates’ on cloning (1998–1999), xeno-transplantation (2000–2001), and genetically-modified food (2001–2002). These debates were all characterized by a broad variety of activities, ranging from local debates and science theatre to public panels and focus groups.

In particular, the GM-food debate “*Eten en Genen*” has received a lot of criticism. It was widely regarded as coming too late in the day, after the government had already published its policy plan. More importantly, it was criticized for the way it framed public involvement. Within the government there existed a strong perception that the GM-food debate had become a trench war between the usual suspects: industry on one side and environmental non-governmental organizations

(NGOs) on the other. The government saw trying to bring these various interest organizations together as a rather useless exercise. As in the British *GM Nation?* debate, the government focused its efforts towards the “general public.” The existing engaged NGOs were merely positioned as sources of information for the “general public.” The government thus narrowed the meaning of public engagement towards involving “pure” and “rational” citizens, thereby sidetracking engaged civic organizations (cf. PAGANINI 2007; Laurent 2011).

### Upstream Public Engagement in Science

Over the last decade there is a growing awareness that the social meaning of science should be evaluated at an early stage. In the fields of genomics and nanotechnology, research into the ethical, legal and social impacts of the science has been established. The Dutch Genomics Initiative has created a Centre for Society and Genomics, to study the social and ethical aspects of genomics, inform the public and stimulate debate. The research program on nanotechnology also has a special technology assessment research program, called TA NanoNed, which is based on the constructive TA vision. In addition, the government set up the independent Committee Societal Dialogue Nanotechnology (CieMDN) to organize a national public dialogue on nanotechnology (CieMDN 2011). This so-called Dutch Nanodialogue ran from March 2009 to January 2011.

However, there is more than meets the eye. One needs to look slightly further into the system of science and technology to perceive the real challenges: A very early attempt in the field of nanoscience to bring in an upstream public perspective illustrates the point. In 1996, the *Study Centre for Technology Trends* (STT) initiated a study to explore the future of nanotechnology. STT thought this early stage provided an opportunity to tune nanotechnology to societal needs and asked the Rathenau Institute to set up a meeting to facilitate public discussion about nanotechnology at the end of the STT-project. This activity, however, did not materialise. The Rathenau Institute had other priorities at the time, and was deeply involved in organizing public debate on cloning. Moreover, this TA organisation was experienced in assessing technology, not science. This one example shows that moving public engagement upstream is by no means self-evident, and that it is not only a matter of involving stakeholders and citizens upstream; experts also need to move upstream.

### A Constitutional Moment in Europe?

The experiences in the United States, UK and the Netherlands all suggest that whereas technology became to some extent an object of public debate after the mid-1960s, it is now science that is emerging as a legitimate object of public and political debate. The arrival of the university-industry complex has gradually changed science into a commercial or business-like activity. As a result, public trust in science can no longer be taken for granted, but has to be renewed over and over again (cf. Berg 2008). This evolving situation requires new institutional structures to

deal with the relationship between science and society. The search for new, “upstream” institutional arrangements arguably began at the end of the 1980s.

To place this shift within an historical perspective, an interesting parallel can be drawn with respect to technology and society, and in particular, to the development of technology assessment. While technology assessment had been institutionalized in the United States in the 1970s, it took more than a decade before it was similarly institutionalized in various European countries. Some countries adopted the US. OTA model, whereas others, such as Denmark and the Netherlands, renewed and broadened it to include both expert stakeholders and lay citizens. Unfortunately, at the time when European experimentation with participatory technology assessment methods was fully underway, the US. OTA was forced to close its doors in 1995.

The search for institutional arrangements concerning public engagement in science thus far appears to be following a similar pattern. In the 1990s, the US. introduced two kinds of expert-oriented arrangements: the ELSI program of the Human Genome project and ethics commissions. Europe has added a participatory flavor which strongly broadens the potential range of institutional arrangements to deal with the relationship between science and society. The new paradigm of upstream public engagement developed in the UK is the best known example of this. However, the Platform for Science and Ethics in the Netherlands also presents an example. There, ethics was not conceived of as the sole domain of ethics experts, but also included individual citizens. The Meetings of Minds project, which presented the first European-scale citizens’ panel on brain sciences, presents another example. This development in Europe is thus enriching the debate and might, in turn, inspire further shaping of the relationship between science and society within the US.

## Conclusion

Western society does indeed appear to be experiencing a new constitutional moment in shaping the relationships among science, technology and society. Interestingly, the starting point of this grand shift, however, lies in the United States. Upstream public engagement, with its plea to involve a broad range of social actors in science, suggests a second phase within this development and has potential to strongly enrich the debate. The experiences in the US, UK and the Netherlands with respect to governing science and technology suggest that there is need for a broad interpretation of public engagement of science that nevertheless includes some clear criteria. For instance, public engagement of science can be understood to include research into the ethical, legal and societal dimensions of science, but should not be equated with it. It should include state-initiated formal citizens’ participation, but cannot be identical to it. Public engagement of science requires both ethical expert commissions and the involvement of engaged citizens and of civic society organizations. Furthermore, it rightly involves evaluating proposals for R&D from a social perspective. This would include cooperation between material scientists and toxicologists in order to design safe nanomaterials. The public engagement of science needs both stimulation and governance of science at the



same time. Introducing a public perspective on science while safeguarding its public value thus involves a diverse set of actors: natural scientists and engineers, technology assessment institutes, policy makers, social scientists, citizens, interest organisations, artists, and last, but not least, politicians. Timely public engagement in science is as important as it is institutionally challenging for *all* of these actors.

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